

Draft
Interim CALFED Cultural Resources
of the
Sacramento-San Joaquin Delta

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Regulatory Context

The most important Federal laws applicable to archeological and historic resources are the National Historic Preservation Act of 1966, as amended, and the National Environmental Policy Act of 1989 and regulations associated with them, particularly 36 CFR 800. These statutes and regulations, as well as others that also apply to cultural resources (e.g., P.L. 93-291), cover all projects that include Federal land, are supported in whole or part by Federal funds, or require a Federal permit (e.g., 404 Permit), include a consultation process with the State Historic Preservation Officer and the Advisory Council on Historic Preservation (ACHP) to ensure that potentially significant historic resources have been adequately considered in the planning for the undertaking.

The National Register of Historic Places (NRHP) has been established by statute to list historic properties deemed to have historical significance (36 CFR 60). Any Federal action that could affect a cultural resource listed on or eligible for listing on the NRHP is subject to review and comment under Section 106 of the National Historic Preservation Act. Affects to these historic properties must be considered in accordance with the regulations of the Advisory Council of Historic Preservation (36 CFR 800). Insignificant cultural remains usually do not require management consideration unless they possess the qualities specified by the California Environmental Quality Act (CEQA) or other laws.

Significance of cultural resources is measured by NRHP criteria for evaluation:

"The quality of significance of American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

"(a) That are associated with events that have made a significant contribution to the broad patterns of our history; or

"(b) That are associated with the lives of persons significant in our past; or

"(c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

"(d) That have yielded, or may be likely to yield, information important in prehistory and history" (36 CFR 60.4).

The most important state regulations providing for the protection of historic properties, including prehistoric and historic archeological resources, is contained within CEQA Appendix K (14 California Administrative Code, Section 15000 et seq.), which outlines procedures appropriate for the protection and preservation of such resources. The Health and Safety Code Section 7052) prohibits the disturbance of human remains except under certain conditions and also specifies procedures (Ch 1492), including consultation with the California Native American Heritage Commission, to be followed in the event that Native American graves are found. Other section of the Public Resources Code (Sec. 5025, 5024.5, 5097.5, 6313), prohibit unauthorized disturbance or removal of archeological or historical resources are to be altered. The State

Penal Code (Section 622.5) applies to objects of historical or archeological interest located on public or private land and, specifically exempting the land owner, provides penalties for damaging such objects.

CEQA Statutes and Guidelines define an "important archeological resource" as one which:

"A. Is associated with an event or person of

1. Recognized significance in California or American history, or
2. Recognized scientific importance in prehistory.

"B. Can Provide information which is both of demonstrable public interest and useful in addressing scientifically consequential and reasonable or archeological research questions;

"C. Has special or particular quality such as oldest, best example, largest, or last surviving example of its kind;

"D. Is at least 100 years old and possesses substantial stratigraphic integrity; or

"E. Involves important research questions that historical research has shown can be answered only with archeological methods" (California Office of Planning and Research 1986:295-296)

More recently, the California Register of Historical Resources (CRHR) (OHP 1994) has defined site significance using criteria closely paralleling those for eligibility to the National Register of Historic Places; however, the guidelines for implementation of these criteria have not been formally issued.

If, after identification and evaluation, an archeological site is determined to be legally important under Federal stature, then a mitigation plan must be prepared in consultation with the SHPO and ACHP. If an archeological site is deemed not legally important, both the resource and the effect on it should be noted but need not be considered further in the process. In the CALFED Program, where both CEQA and NRHP evaluation criteria apply, Federal standards prevail. Historic properties assessed as NRHP-eligible are also considered significant and procedures for managing these properties under 36 CFR 800 satisfy the CEQA Statutes and EIR Guidelines as well.

Treatment of human remains is covered under both State and Federal law and regulation. The Archeological Resources Protection Act (except for inter-state transport) and the Native American Graves Protection and Repatriation Act is specific to Federal lands; State law covers State, non-Federal public and private lands.

The American Indian Religious Freedom Act (42 U.S.C. Part 1996) sets forth a governmental policy that Federal agencies consider the consequences of its decisions on Native American religious practices.

Background

Most of the lands in the study area were acquired initially from the State by individuals through the purchase of swamp and overflow lands during the period from 1858 to 1870 (USBR Report DL-5, 1964). Early attempts, beginning in the 1850's, were made to reclaim the various islands; however, levee failures

occurred periodically and it was not until after 1907 that the frequency of flooding was substantially reduced by the development of better levee systems. The elevation of the study area is near or below mean sea level. As a result of reclamation and agricultural practices, surfaces of the former tidal and floodplain lands have been lowered through (1) oxidation of organics after exposure to drying, (2) burning of peat soils, (3) wind erosion of loose dry peat soils, and (4) localized compaction by heavy farm equipment (Weir 1950). Artificial levees have restricted river flows and their sediment loads to channels that have little resemblance to their natural configuration and sediment deposition patterns. These practices have left all or major portions of the former tidal and floodplain islands and tracts 5 to 18 - feet below mean sea level exclusive of the surrounding levees.

Irrigation water is delivered almost entirely by siphons or gravity. Drainage is a major concern; a system of drains, including toe drains at or near the inside base of the levees, are present on most of the study area lands. Pumps are required to remove drainwater. Water delivery and drainage requirements have resulted in the construction of a large and complex system of irrigation canals, distribution ditches, drains (surface and sub-surface), collector basins and pump stations.

The amount of historic modification to lands in the study area cannot be over-emphasized. Levees, rip-rap, dredging, channel cuts, canals, drainage ditches, pump stations, and cultivated fields characterize the project area. No stands of unmodified native vegetation remain and many introduced plants are commonly dominant. Prior to 1850 the Delta was vast tule marsh with riparian forests along the natural levees of the major drainages. Fossil evidence indicates that this vegetation was present for at least 6000 years (West 1977). Despite the recent historic alterations, wildfowl are seasonally abundant, especially where lands are specifically managed to enhance their habitat.

Prehistoric Background

To comprehend the prehistory of the Sacramento-San Joaquin Delta it is necessary to appreciate the development of the present Delta. Unlike true deltas, such as the Nile, the geologic Delta is a large tidal wetland and flood plain at the juncture of the Sacramento and San Joaquin Rivers. Other rivers, such as the Mokelumne and Cosumnes, are important contributors. Drainage from one-third of the State's land area passes through the Delta.

The current Delta is primarily the result of post-Pleistocene sea level rise, aggradation of fine grained sediments, and the bio-accumulation of organics (Atwater 1980, Schlemon and Begg 1975, West 1977). While there is some evidence for tectonic subsidence, the amount has not been clearly determined for the Holocene. At the end of the Pleistocene (>10,000 years ago), sea level was more than 180 feet lower than today (Atwater, Hedel and Helley 1977) and the shoreline was situated some distance west of San Francisco. Sea level rose rapidly until about 8000 years ago and then slowed considerably. By 6000 years ago the current Delta began to form. Consequently, the aggradation of fine grained sediments and bio-accumulation of organics, mostly derived from aquatic-emergent plants, were the primary factors in the evolution of the

Delta. With the exception of aeolian sand mounds, most of the Delta deposits at or below sea level are relatively recent and generally less than 6000 years old.

The contact of pre-Holocene deposits with Holocene deposits is not well defined but generally consists of alluvial fan deposits and late Pleistocene-age dunes. During late glacial times much of the area must have been subjected to erosion because of changes in base level. Channels would have been incised during periods of lower sea level and any associated deposits should be coarser-grained than the Holocene-age Delta mineral deposits, which consist primarily of silts and clays. Earlier interglacial Delta deposits would have been scoured.

Prior to 1850, before significant human modification, the Delta consisted of intertidal wetlands laced with about 100 square kilometers of subtidal waterways (Atwater and Belknap 1980). Flood plains of tributary rivers, mainly the Sacramento, San Joaquin, and Mokelumne, merged with these tidal environments, producing supratidal levees within the Delta and seasonally converting many tidal wetlands to alluvial flood basins. It was primarily upon the levees that both prehistoric and early historic settlement occurred. Additional areas of relatively high ground are the relict aeolian sand mounds scattered throughout the Delta. These too were used for burial, resource procurement, and habitation sites by prehistoric populations and later by historical settlers. The Piper series soils (Cosby 1941) are representative of some of the aeolian deposits. Many of the sand deposits are strongly indurated suggesting considerable age. Atwater (1982) has dated the dunes on Bradford Island at 10-14,000 years ago; elsewhere in the Delta he has dated dune deposits to a minimum of 7000 and an approximate maximum of 40,000 yrs B.P.

The Mokelumne River is the largest of the San Joaquin River tributaries, contributing about 22 percent of the entire San Joaquin Valley run-off. The result of this large amount of run-off is an alluvial fan that deflects the Sacramento River to the west. Schenck and Dawson (1929) noted that this interaction was significant in the interpretation of the area's archeology. The Mokelumne offers a comparatively old Delta surface, parts of which have remain unchanged for a long period of years under natural conditions. The distribution, density, and age of the prehistoric sites is consistent with their contention (Pierce 1988).

Prior to historic leveling for agriculture many of the prehistoric sites in the Delta were low mounds, ranging in height from six inches to over 7 feet above the surrounding land surface (Schenck and Dawson 1929). Mound slopes were gentle. Mounds are generally assumed to be natural rises that were enlarged by the gradual accumulation of midden, although there is some historical evidence that they may have been intentionally modified by the inhabitants (Belcher 1843:130). Some of the mounds extend below the current ground level and some are buried entirely with no surface evidence. These later sites have been found exclusively during excavations unrelated to archeological investigations. Sites are generally located adjacent to watercourses. Late prehistoric sites are found along and upslope of the 1850

tidal influence line¹ and on sand mounds within 10 feet of present day sea level (Table ____). The composition of the cultural deposits varies greatly from black loam to yellow silty clay. Intermediate deposits contain varying amounts of fine sand, generally yellow or tan in color, and may be representative of sub-levels of mound deposits. Hardpans are common in sites in the higher elevation areas and in some sand mounds, likely the result of long-term weathering. No prehistoric cultural deposits, other than isolates, have been reported in peat (>50 percent organics) or peaty mucks (25 to 50 percent organics).

With the geomorphic model of Delta development, in situ prehistoric remains contained within Delta deposits are restricted to the upper two-thirds of the Holocene (<6000 years). Unlike the San Francisco Bay where sites extending 3 feet to 18 feet below sea level have been found (Bickel 1978), no prehistoric Delta sites, with the exception of one questionable report (CALTRANS 1989), have been found to extend below contour elevations of -5 feet below mean sea level (based on USGS 7.5' quad. map elevations).

Some Delta sites are reported to extend below present ground level and others are completely buried by alluvium. No attempt has been made to measure or date this alluviation, but the rate is undoubtedly highly variable and, as Schenck and Dawson (1929:330) point out, a single event may be accountable. The few radiocarbon dates available for cultural deposits are all <4500 years B.P. (Schulz 1981: Appendix 2). These relatively late sites were easily recognized and therefore they were noted by early researchers. Manifestations of earlier cultures after thousands of years of weathering, burial, and erosion may be far more subtle and not so readily evident as the later period sites. This does not preclude that earlier sites and sites with deposits significantly below sea level could be found, but it does indicate the likelihood of finding such sites would be low. Such a finding, however, would be important since it might clarify the role that sea level and subsidence has had in the development of the Delta during the Holocene and reveal an unknown cultural pattern.

History of Archeological Research

The Sacramento-San Joaquin Delta, along with the adjacent areas of the lower Central Valley, comprises one of the most intensely investigated areas in the archeology of California. Due to its position at the geographical center of the State, a rural region conveniently accessible from urban centers, and a zone of high prehistoric population density, the Delta has attracted archeological interest for more than a century (Belding 1882; Davis 1907; Holmes 1902; Kroeber 1929; Schenck and Dawson 1929). Some of the earliest known excavations in the south Delta area were made by James A. Barr, a superintendent of schools for Stockton, sometime between 1898-1901. Barr worked on Union Island northeast of Bethany, possibly at SJo-137. SJo-137 may have been the mound where the Spanish expeditions of 1808 and 1811 reported

¹ The line is derived from Atwater (1982) who defines the historic wetland margin as approximating the line of extreme high water during the autumn months (peak equinoctial tides) under conditions of low river discharge.

the village of Pescadero ("man who sells fish"), so named because they saw Indians with fish there (Hoover, Rensch and Rensch 1948, Schenck 1926). The name Pescadero suggests that some exchange between the Spanish and Indians had occurred. Bennyhoff (1977) identifies Pescadero (Cholbon) as a triblet center. The collections from Barr's excavations are in the University of California Museum of Anthropology (Ragir 1972).

Large-scale systematic excavations were initiated in the 1930's by Sacramento Junior College and the University of California (Lillard, Heizer and Fenenga 1939). The major results of this work have been to discredit previous assumptions of a general uniformity among all prehistoric cultures, and the development of a tripartite culture system for Central California. Recent topical reviews have been presented in Dorn (1980), Heizer (1974), and Schulz (1981). Johnson (1976) has summarized the numerous studies of prehistoric sites conducted in the Cosumnes drainage. Subsequently, he and his students have added a considerable increment to the area's data base. For the upper Mokelumne, Maniery (1991) has reviewed the prehistoric and historic data base and produced a summary report. Parts of several Delta island were recently surveyed for prehistoric and historic cultural resources as part of a water storage study (Maniery and Syda 1988).

Cultural Chronology

The Central California culture sequence is based on the stratigraphic position of culturally distinct components, recognized on the basis of recurring funeral patterns, artifact types, and induration (Lillard, Heizer and Fenenga 1939). Three periods or horizons are recognized: termed simply the Early period (now dated approximately 2500-500 B.C.), the Middle period (500 B.C. to A.D. 300) and the Late period (A.D. 300 to 1840). This sequence has proven extremely useful, particularly because many of the temporally diagnostic artifact types are distributed widely and contemporaneously throughout Central California and neighboring areas.

Marked cultural differences between localities have occurred at various times however, which are not reflected in the temporal sequence. Consequently, attempts have been made to classify the cultural complexes of Central California independently. The most acceptable classification thus far is that of Fredrickson (1974), which defines three major patterns, the Windmill, Berkeley, and Augustine.

The Windmill Pattern is known only from the eastern Delta, Camanche Reservoir area, and adjacent areas of the lower valley from the middle Cosumnes River to Stockton. This pattern is equivalent to the Early period in this area, and is characterized by extended, westerly oriented burial positions, degree of weathering and induration, as well as diagnostic shell ornaments and stone tool forms. Considerable debate has focused on the subsistence base of these people; there is a good possibility that acorn processing was unknown or unimportant (Gerow 1974; Heizer 1974; Schulz 1970, 1981).

The Berkeley Pattern is equivalent to the Middle period in the lower Sacramento Valley, but earlier phases may be coeval with the early period in

the Bay area. It is characterized by flexed burial positions, diagnostic ornaments, and, in the valley, by the proliferation of bone fish spears or leister points and stone pestles. This appears to correspond with an increasing dietary emphasis on fish and acorns.

The Augustine Pattern corresponds to the late period in the lower Sacramento Valley. It is marked by the appearance of small projectile points indicating the introduction of the bow, and by changes in funerary patterns and ornament styles. These cultures in general appear to be ancestral to the ethnographic groups of the same area and Bennyhoff (1961) has been able to correlate areal distribution of archeological artifact styles in these late groups with historic linguistic boundaries.

An additional culture pattern should be noted: the Meganos Complex defined by Bennyhoff (Fredrickson *ibid*). This complex has been assigned to the Middle and Late periods in the lower San Joaquin Valley and the western Delta, and is characterized by high frequencies of extended burials without predominate orientation and by distinct cemeteries unassociated with midden areas. Such cemeteries of the Middle period age are known particularly from the sand mounds of Jersey Island, Bradford Island, Bethel Tract, Hotchkiss Tract, and Holland Tract (Cook and Elsasser 1956). It is apparent that these mounds, which can now be excavated only with great difficulty, have consolidated since the internments were made. Sites of this complex share the fishing/acorn dietary emphasis of the Berkeley Pattern.

Native Peoples

The native peoples of the study area were divided among five linguistic groups, all belonging to the Penutian language stock. The far northeastern part of the Delta was occupied by the Valley Nisenan, the eastern part and farwestern part by Plains and Bay Miwok speakers, the southern part by the Northern Valley Yokuts, and the north shore of the Suisun Bay area by the Patwin. Despite sharing the same environment there were distinct material cultural differences among the five groups (Bennyhoff 1977:47). For example, the Plains Miwok used wooden mortars whereas their delta neighbors, the Yokuts, used stone mortars.

The Plains and Bay Miwok, are members of the Utian family of the Penutian stock languages (Shipley 1978). The boundaries and divisions of the Miwok in this area, and delineation in to groups, is based largely on linguistic evidence (Bennyhoff 1977, Kroeber 1925, Levy 1978, Schenck 1926). The Miwok were intensive collectors; they occupied large, fixed, multi-lineage villages (tribelets) located on high ground generally adjacent to watercourses. Most villages were occupied permanently except for short periods of harvesting. Camps for fishing and hunting also were part of the settlement system.

There has been some dispute over the exact boundaries and divisions of the Northern Valley Yokuts and Miwoks in the Delta, and delineation of groups is based largely on very limited and problematical historical and linguistic evidence (Bennyhoff 1977:127, Schenck 1926, Kroeber 1925, Wallace 1978). Moraga recorded the location of the change from Yokuts to Miwok language at the Mokelumne River when he led the first Spanish expedition into Plains Miwok

territory in 1806. The approximate area the Nochochomme-Cholbon Yokut triblets habitat was between the San Joaquin River on the east, the Old River (western channel of the San Joaquin River) on the west, south of the confluence of the three main channels on the north, and to about the point of trifurcation of the channels in the south (Bennyhoff 1977:map 2). The native population was not evenly distributed. Rather, it was clustered in a narrow strip of land boarding the San Joaquin River and its main tributaries (Wallace 1978). Baumhoff (1963:MAP 7) estimated a density of 10+ persons per square mile along the waterways, which is congruent with Schenck's (1926) estimate for the Delta marshlands. Schenck (ibid) estimated that villages averaged about 200 persons each and were located along the main rivers five to ten miles apart. Based on historical records Cook (1955) estimated that the area contained four or five settlements with a combined population of 1,300 persons. Fr. Ramon Abella in 1811 noted three rancherias (settlements) with a population of 900, or 300 per rancheria (Cook ibid).² Considering the 200 or so Indians missionized from the area, Cook (ibid) concluded that the aboriginal population was 1,500 or greater.

The Northern Valley Yokuts were semi-sedentary with principle settlements on low mounds or levees³ composed of sand, silt and clay on or near the banks of major water courses. Loosely centralized tribes headed by a hereditary chief were tied to one or more principle villages. Secondary settlements consisted of small camps or villages of several households. Settlement locations appear to be in response to subsistence resources and protection from winter and spring flooding. Security also may have been a factor but direct evidence is lacking. Settlement groups broke up seasonally to exploit other resources, such as acorns, as they became available within a well defined territory for fishing, gathering and hunting. Settlements contained domed-shaped houses and shelters made of brush and tules. Archeological data indicate that human internments were made at Delta settlements and cemeteries. Besides settlements there were fishing stations, hunting camps, and lithic tool manufacturing sites. All lithics had to be imported.

Fish, fowl, acorns, and tule roots were the primary Northern Valley Yokut subsistence resources. Other resources, such as freshwater bivalves, small mammals, seeds and bulbs, also were important. Elk, deer, and antelope, although reported abundant and easily hunted by the early explorers, probably constituted a marginal subsistence resource (Wallace 1978).

Because of the early disruption of Yokut speakers, little ethnographic information is available other than some demographic data recorded by explorers and missionaries, and some linguistic description (Bennyhoff 1977, Schenck 1926, Schulz 1981, Kroeber 1925).

²Cook concluded that the rancherias would have been north or north west of Pescadero, a triblet center to which repeated reference is made in early documents. Bennyhoff (1977) rejects Cook's conclusions regarding affiliation of the three rancherias and his placement of Pescadero (Cholbon), but appears to accept the population estimate for the settlements.

³Natural river levees were apparently restricted to the major drainages.

Patwin refers to several tribelets who occupied the west side of the Sacramento Valley extending from Suisun Bay northward to just above the town of Princeton on the Sacramento River (Johnson 1978). The Patwin, like the Nisenan, Miwok and Yokuts, have been classified as belonging to the Penutian language family, however, "Patwin" does not indicate a political unity but instead was a term used by by several tribelets in reference to themselves (Johnson *ibid.*). Patwin tribelets generally occupied one primary and several satellite villages, and each had a definite sense of territoriality and autonomy (Johnson *ibid.*). Subsistence, like their neighbors, was based on hunting, gathering, and fishing. Details on the lifeways of Patwin who occupied the northern shore of the Suisun Bay area are poorly known as they were among some of the earliest groups in the region to be affected by missionization and introduced diseases. Bennyhoff (1977) identified the Patwin tribelet of Tolenas in the Suisun Marsh area.

The destruction of native Delta cultures was the result of several factors. First, was the effect of missions in northern California (Castillo 1989). Even before explorers and settlers made extensive contact, the missions of San Jose, Santa Clara, and others were drawing Indians away from their native villages. Second, was the deadly effects of European diseases. This factor was especially devastating in 1833 when thousands were killed by an illness, possibly malaria, and numerous villages were abandoned. A third factor which disrupted native societies was the secularization of the missions in 1834. This caused many missionized Indians of various cultural affinities, seeking refuge from Europeans, to retreat into areas of previous cultural homogeneity (Wallace 1978). The final collapse of independent Delta cultures occurred when waves of American settlers after the Gold Rush appropriated native territory for agriculture. Meanwhile village mounds of the native peoples were abandoned, re-occupied by farmhouses, buried under artificial levees, or leveled for agriculture. However, some native groups in upland areas had stabilized enough by 1872 that dance groups were in full operation (Bennyhoff 1977:89).

Historical Context (To be expanded upon by PAR Environmental)

Several Spanish expeditions, beginning with Fages' in 1772, made some contact with Indians of the Sacramento-San Joaquin Delta area, although it was not until the first decade of the 19th century that many of the Bay and Plains Miwok groups were encountered by explorers. These expeditions were led by Gabriel Moraga in 1806, 1808 (Bennyhoff 1977) and Abella in 1811 (Cook 1960) and they found that many of the villages contained mission runaways. In an 1817 exploration of the north and south Delta, only the north Delta portion of the expedition encountered the Plains Miwok, the south Delta only Yokuts (Bennyhoff *ibid.*:26).

Under pressure from the missions with their associated military garrisons, tribal domains within the Delta apparently broke down rapidly. Cook (1955:56) states that "the delta area...was entered relatively early by the Spaniards and by the year 1820 had been almost completely swept of its native population." During the Mexican Period and subsequent breakdown of the missions the Delta became a refuge for Christianized Indians. This period was short-lived since settlement by Anglo-Hispanics soon began.

In the hope of creating stability in the interior, and to build a buffer zone for the coastal areas, California's governors awarded land grants in the Delta region. Paso del Pescadero which faced upon Old River was granted in 1843. It was owned, but not occupied, by Antonio M. Pico. The grant was patented by the United States on March 10, 1865. Pico and one of the pioneer reclaimers in the Delta, Henry M. Naglee, were the claimants of the 35,546 acre tract (Thompson 1957).

Further elimination of native people came a few short years after the American conquest of California in 1846, largely as a result of the 1849 gold rush and its aftermath. Argonauts passing through the area on their way to the mines pushed aside any natives in their path. After failing at mining many of the argonauts turned to farming, disrupting the remaining Indian subsistence resources and practices.

The magnitude of the historic changes cannot be underestimated and today only a very small percentage of the Delta retains relatively natural conditions (West 1977). None of the lands in the study area are unchanged; all have been modified to a greater or lesser degree by agricultural or dredging activities. As summarized by Atwater and Belknap (ibid), human activities since 1850 have greatly altered the Delta. Artificial levees, erected for flood control and agricultural reclamation, now surmount all of the major natural levees and surround 98 percent of the historic wetland. Areas of diked wetland now lie as much as 18 feet below sea level because of decomposition and deflation of cultivated peat (Weir 1950). Locally, such as along the North Victoria Canal, the land is mantled by sand and silt from floods that breached the levees. Waterways have been shoaled by sediment from upstream hydraulic gold mines, deepened by dredging of construction material for levees, and interconnected by dredged-cut channels. Artificial channels such as the Grant Line Canal, West Canal, Victoria-North Canal, Woodward-North Victoria Canal, as well as numerous smaller cuts along Old River are common throughout the Delta.

Thompson and Dutra (1983) and Thompson (1957) have discussed the dredging and reclamation history of the Delta. During the decade from 1860 to 1870, 15,000 acres of the Delta had been reclaimed; by 1930 total reclaimed area exceeded 441,000 acres.

The Tide Land Reclamation Company partially reclaimed Union Island before selling it to T.H. Williams in 1875. The first levee enclosure of any size was made in 1872, but this was washed out in the spring of 1876. By the fall and winter of 1876, 45 miles of levee were under construction. Victoria and Woodward Islands were created by dividing them from Union Island. The canals outlining the present Victoria Island were cut before 1885. Work began on the North Victoria/Woodward Canal in mid-September 1876 by a labor force that included up to 3,000 Chinese workers. Seven to eight miles of twin retaining walls were in-filled with dredged pumped sand to create the levees for the canal. The Von Schmidt rotating siphon pump dredge worked at Union and Victoria Island until 1882. Portions of swamp varying in size from 10 to 100 acres were left on the natural channel side of Union Island to avoid the cost and flood risks associated with building levees around meander bends. Subsequently these swamps have been removed or have been cut into islands with further channel modifications.

Reclamation of the Pescadero properties began in 1877 with the construction of a 750-foot dam across the head of Paradise Cut, the second distributary into which the San Joaquin River divides as it enters the Delta. Some 400 workers constructed the seven-foot-high earth barrier and prepared 2,000 acres for cultivation near Old River. At about the same time other crews completed the levees on the Pescadero part of Union Island (Thompson *ibid*).

The Byron and Clifton Court tracts were reclaimed prior to 1900. Initial reclamation of the Byron Tract in 1870-74 began with a 4.5-foot levee along Old River. Flooding in 1875 was followed by the enlargement of the levee to the south during 1877 to 1879, but the land was not fully reclaimed until about 1900. Clifton Court Tract was reclaimed in 1898 or 1899 (Thompson *ibid*). Both tracts flooded on March 22, 1907 and the dredge Albion was used to restore the Byron Tract's levee system in 1908. In 1909, the dredge Big Dipper worked for some months raising 17 miles of embankment at the Byron Tract. The purpose of all this work, of course, was to reclaim the rich agricultural lands (Cosby 1941). All the levees have been modified and enlarged over the last 80 years and none of the original levees remain intact. Clifton Court Tract was flooded for the forebay of the State Water Project Delta pumping plant in the 1960's.

Generally, land tenure change has consisted of large units of property broken-up into small units with tenant or crop-sharing farmers which subsequently were consolidated into larger units. Today, like in the past, much of the land in the study area is corporate held by non-residents, though a number of large family farms still remain. Leasing of farm land is still common. A result of property consolidation has been the destruction of tenant farmsteads and labor camps or, less often, these structures have been moved. Abandoned structures commonly were burnt and the land used for crops.

Mechanized farming has replaced the need to have large numbers of laborers except for specialized short-term activities. Also, the ethnicity of the work force has changed through time. Prior to the exclusion acts of the 1880s, the Chinese were the primary laborers. They were replaced by other immigrant groups such as the Italians, Portuguese, East Indians, Japanese, and Mexicans. Up until World War II a large percentage of Delta farm laborers and share croppers were Japanese. Today Mexicans and Mexican-Americans are the primary laborers.

Most of the crops grown in the study area are high value, such as asparagus, and a large percentage are shipped fresh throughout the United States. Trucks, trains, and planes have replaced barges and boats for the shipment of agricultural goods. Landings for the most part have been abandoned. Prior to the 1950s canneries adjacent to the study area were the major food processing mode.

Potential historical structures in the study area are all related to agricultural activities. These include farmsteads, labor camps, landings for the shipment of agricultural produce, canneries, pumping stations, siphons, canals, drains, unpaved roads, bridges, and ferry crossings. Typically farmsteads consist of one or more houses, a barn, corral, and work/equipment sheds. Farmsteads were almost always placed on the highest elevation on the

property, quite often, on or adjacent to levees. Forty known historic sites are on top of prehistoric sites (Table ____). Labor camps generally consisted of one or more wooden bunkhouse or boarding house, dinning hall, cookhouse, washroom, and privies. Associated were barns, corrals, workshops, equipment sheds, and offices for the management. Some of the structures were elevated on piers. Most labor camps were located adjacent to levees. Landings for the most part were not elaborate and consisted of a few pilings or a dolphin, and in a few instances a loading dock sometimes associated with a large packing shed on or adjacent to the levee. Pump stations and siphons were and are still used lift tail water and seepage over the levees and to maintain ground water levels. Most irrigation is done by gravity feed. With few exceptions canals and drains are unlined ditches. At least three ferry crossings were present in the study area. The ferry crossings to Clifton Court and north of Bethney are noted on the 1913 USGS map. Primary roads are typically on levees or placed on raised berms. Other activities represented, but of no historical significance, are recreation properties-waterfowl hunting lodges, bait shops, retirement homes, marinas, and resorts. Today no hunting lodges remain in the study area. Some "lodges" served as bawdy houses.

Mohr's Landing located north of Bethany was first known through the 1850's as Burns' Landing (for Maurice Byrnes), it was renamed Mohr's Landing in honor of German emigrant and pioneer John Mohr (Hillman and Covello 1985). Mohr established a settlement on the west bank of Old River. The Pacific Coal Mining Company in Corral Hollow shipped coal to a barge-loading facility here in the 1860's. The floods of 1862 and 1864 destroyed the riverside settlement of Mohr. Moving to higher ground to the south, Mohr constructed a hotel and initiated the town of Bethany. Railroad service began in 1878 and by 1880 there was a railroad station, general merchandise, liquor store, hotel, blacksmith and wagon maker shops. During the early 1880's a second blacksmith shop, butcher shop, and shoemaker shop were established. A post office was contained in James O. Hutchins general merchandise store. The town served as a shipping point for hay, grain, sugar beets and, in later years asparagus. Bypassed by other transportation routes, however by 1929 only one business, a general merchandise, remained listed for the town. In 1940 the post office closed. The 1943 Corps of Engineers 15 min. topographic map gives the name "White House Landing" on the north side of Old River across from Mohr's landing and has symbols for several structures in the Bethany area. Today none of the town's business or railroad buildings remain.

Bacon Island is the only Delta island that still retains most of the labor camps of the early 20th Century (Maniery and Sydra 1988). More typical today is Victoria Island which is completely devoted to large scale modern agriculture. Structures are limited a few farm laborer's homes and farming related storage facilities and offices, none of which are more than 50 years old and none have any historic value. Virtually all the earlier structures have been removed and the areas are now under cultivation. Irrigation is by gravity through unlined canals. Most of the island is managed by Victoria Island Farms, which has been owned by the Nichols family since 1963. Victoria Island Farms is one of the largest asparagus producers in the state, with 1,800 acres and annual production of more than 6 million pounds (Oltman 1994). Only a few of the structures noted by Schulz and Ferris (1994) for the north Delta remain.

Methods

To assess cultural resource distribution in the study area information was obtained from the State Office of Historic Preservation and the Information Centers at Sonoma State University, Sacramento State University, and Stanislaus State University. A delimited file containing locational and site attribute data from the California Archeological Site Inventory was clipped to restrict geographic coverage to correspond to the study area. This data was downloaded into Reclamation's Geographical Information System (GIS) with Arc/Info 7.0.3 as the primary software. Programming was accomplished through ArcMacro Language. Site locations were plotted on U.S.G.S. 7.5 minute quadrangle overlays using Universal Transverse Mercator coordinates and compared to hard copy locations obtained at the Information Centers to check for accuracy. For all records where locational errors were discovered they were corrected. Plots were made on soils/landform data and Atwater's 1850's line of tidal influence and Quaternary sand deposits. Site density was determined for each individual soil/landform unit. Further sorts were based upon site attributes.

Discussion:

A total of 192 prehistoric sites have been formerly issued trinomials for the study area. The State Historic Preservation Office maintains a data base of archeological sites using information supplied by individual Information Centers on Encoding Sheets. These sheets include a full spectrum of data. Sixteen attributes are employed to describe the variability of California archeology. Sites may be described using one or more attribute and their use is not rigorous. Encoding level information is used for this study. Existing data bases were accessed where available and data collected from individual information centers was condensed to be consistent with encoding sheets.

Seven site categories are used in this study. These are portrayed in Table 1. The overwhelming number of sites are sites with habitation debris, representing 54.7 percent of the known sites. These sites contain various data sets and are sometimes represented by additional attributes (Table 2).

Attribute	Number	Attribute	Number
Lithics	13	Burials	53
Ceramics	2	Hearths Pits	10
BRM/Milling	12	Other	58

Table 2. Distribution of attributes for Habitation debris/Burial sites.

A fair number of the Unknown and Other category sites, as well as some burial sites, may contain habitation debris, but with out field checking this can not be determined. Ninety-two sites (47 percent) are reported to contain burials (Table 1), but the actual number is probably higher since this figure is undoubtedly biased as to whether or not any subsurface investigation has taken place. The rockshelter and BRM/milling feature are near one another in an upland area of Contra Costa County and, while in the study area, are not within the geologic Delta.

Landforms	Area	%	Prehistoric Site Codes								Total	%
(Landform Code)	(x1000)	Area	01	02	04	07	16	15	15,09	09	Sites	Sites
Channel Deposits (11)	82.1	10.3	11				7	23	14	12	67	34.9
Mucks: Delta/Marsh (12)	62.0	7.8							2		2	1.0
Flood Plains (14)	59.1	7.4	4				5	3	8	8	28	14.6
Peat and Muds (15)	185.9	23.4	1				1	3	9	4	18	9.4
Organic Soils (16)	105.2	13.2	1				1	1		1	4	2.1
Basins & Basin Rims (22)	151.8	19.1	3	3			2	17	17	13	55	28.6
Interfan Basins (31)	8.2	1.0									0	0.0
Fans Basins Terraces (32)	36.9	4.6						1			1	0.5
Eolian Deposits (33)	14.6	1.8					1			1	2	1.0
Valley Fill (34)	38.3	4.8			1		2	1	2		6	3.1
Alluvial Fans (35)	9.2	1.1									0	0.0
Low Terraces (41)	25.5	3.2					2	1	1		4	2.1
Dissected Terraces (51)	4.4	0.5						1			1	0.5
Steep Uplands (62)	7.0	0.8				2		1			4	2.1
Mountain Slopes (63)	4.5	0.5									0	0.0
Total	794.7	---	21	3	1	2	21	52	53	39	192	---
Percentage of Site Types			10.9	1.5	0.5	1.0	10.9	27.1	27.6	20.3	---	---

Table 1. Distribution of prehistoric site types by soil/landform type in the Bay-Delta study area.
 Prehistoric site types: 01: Unknown; 02: Lithic Scatter; 04: BRM/Milling Feature; 07: Architectural Feature; 16: Other; 15: Habitation Debris; 15 and 09: Habitation Debris with Burials; 09: Burials.

Archeological sites are spread disproportionately across the study area. Certain landforms contain a relatively greater number of sites than others. Channels deposits, flood plains and basins contain only 37 percent of the total acreage within the Bay-Delta study and yet 78 percent of the prehistoric sites are located within these landforms (Table 1).

There are negative correlations between the distribution of sites and landforms, as well. Those land forms identified as mucks, organic soils, and fans, basins, and terraces contain and aggregate of 25 percent of the study area land mass. Yet, only 3.5 percent of the prehistoric sites are found here. The ratio of percentage of site types to the percentage of landform for these three "barren" land forms is 0.14. The ratio for the "productive" areas noted above is 2.1 or 15 times greater than the "barren" landforms. These figures do not factor in the amount of area inventoried.

Inventory in the Delta has been problematical, at best. Relatively little systematic inventory has been accomplished in the face of overwhelming impacts from wide-spread agricultural development. Recent inventory reports describe systematic methods where only a small percentage of the study area were examined. And yet, we believe that the majority of habitation sites present in the Delta have, in fact, been recorded. Prominent prehistoric mounds attracted the interest of early archeologists and many sites were documented. Approximately 80 percent of the known prehistoric sites were recorded prior to 1960 (Figure __). The absence of thorough inventory precludes development of a controlled site density model, although a relative site density model appears to be justifiable.

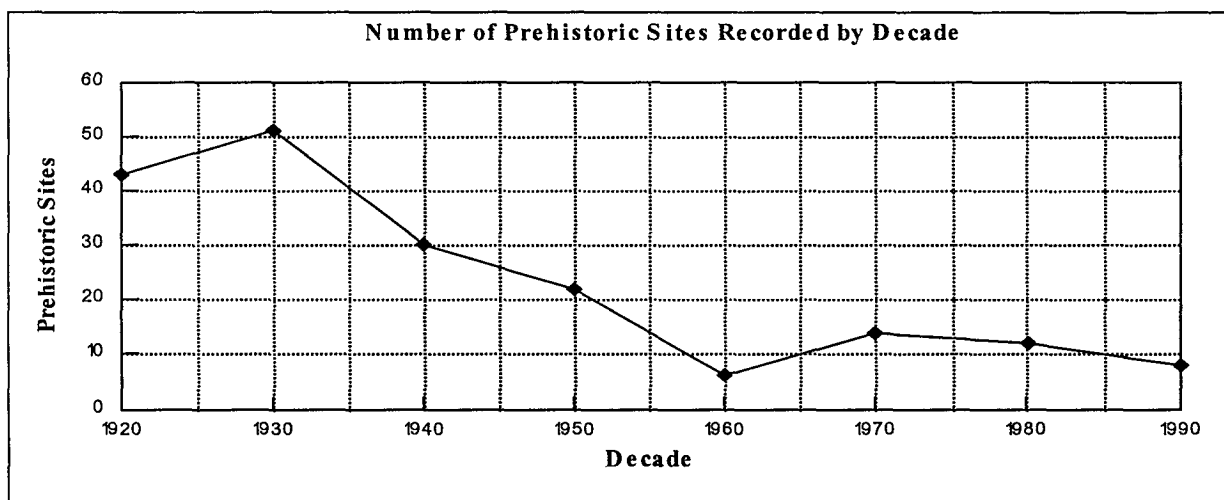


Figure X. The number of sites recorded in the study area as defined by the decade of their discovery.

One landform deserves special mention. Peat and muds of tidal wetlands represent 23 percent of the study area but contain 10 percent of prehistoric sites. It is generally believed that such peat lands were undesirable for prehistoric occupation (West 1994). Pleistocene fossil sand dunes and other

sand mounds protrude through these peat soils and it is these micro-environmental localities that served as the basis for habitation. Such areas served as one foundation for the well-known mounds found in the Sacramento-San Joaquin Valleys. With the exception of six delta quadrangles, the current level of detail a a controlled site density model, although a relative site density model appears available through GIS-data does not record the presence of these sand features. In those quadrangles where the sand mounds have been mapped the correlation with site location is unambiguous.

The distribution of sites within Basins and Basin Rims warrants further discussion. This area contains 28.6 percent of prehistoric sites within 19 percent of the land mass for a density of 0.23 sites per square mile. This relatively high number of sites occurs despite a vast tract of this landform in the northwest of the study area, corresponding, in part, to the Yolo Bypass. Deleting the 72,000 acres and the five archeological sites from this area changes site density figures. The density for the reduced area jumps to 0.40 sites per square mile. This suggests that portions of this landform outside the Yolo Bypass may hold archeological sites.

Elevation is another environmental variable that enters into site location. Eighty-eight percent of the sites in the study area are located beneath an elevation of 15 feet. The majority of sites or 77 percent are positioned in a band between sea level and 10 feet. Only sixteen sites are recorded with elevations higher than 25 feet. This is largely due to the definition of the "Legal Delta" that includes some upland terrain. Reported elevation for sites in the geologic Delta ranges from 5 amsl to >5 bmsl. In the elevation range between -10 to 15 feet the overwhelming majority (97%) of sites, particularly the earlier ones, are found between 0-15 feet above msl. Of the six sites reported to be below mean sea level, only one (SJo-225) is reported to be greater than 5 feet bmsl, the remaining five are between 3-5 feet bmsl. SJo-225 was discovered during construction of a drainage ditch. It reportedly contained at least three burials and evidence that suggests habitation debris might be present (CALTRANS 1989). The area of the find was greatly disturbed and only elevations from the ground surface were provided, thus the accuracy for the depth of >5 feet below sea level is questionable and warrants further clarification. Elevation of the ground surface had been raised by the recent placement of peat soils on top of the sandy soils in which the burials were found.

The distribution of Bay-Delta site types differs from other regions of California (Figure Y). The American River Water Resources Investigation (ARWRI) study area lies contiguous to the current study and extends eastward into mountainous terrain. Nearly 1000 prehistoric sites comprise the data base for ARWRI. The percent distribution of site types for both studies show differences. Lithic scatters, bedrock mortars and milling features constitute an important component of the ARWRI study area compared to the Bay-Delta data. Such differences represent a manifestation of distinct landforms and geology between the two study areas. An study of the date that sites were recorded within the ARWRI has not been made, but it is certain that upland areas benefitted more from the advent of environmental laws and their call for archeological inventory than did the lowlands of the Sacramento-San Joaquin Delta.

There are other difference. Sites containing burials dominate the Bay-Delta data base, but they are less frequent in the ARWRI study. The site type, habitation debris, dominates the ARWRI graph and may reflect the wide-spread occurrence of these sites across landform boundaries.

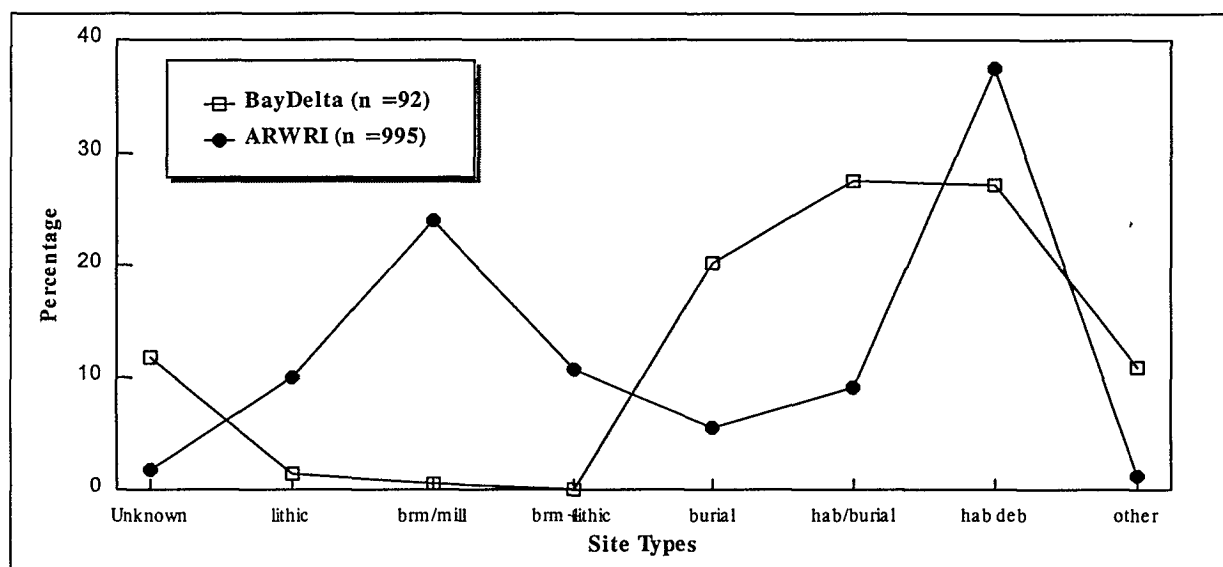


Figure Y. The percent distribution of prehistoric site types for the Bay-Delta and the American River Water Resources Investigation study areas. Note: lithic: lithic scatter; brm/mill: BRM/Milling Station; brm+lithic: BRM/Milling Station and lithic scatter; hab/burial: habitation debris and burial(s); and hab deb: habitation debris.

Geographic Reconstruction

As noted the geography of the Sacramento-San Joaquin Delta is far different today than it was prior to about 1850, before extensive dredging and building of levees for reclamation of farm land. In some cases these activities have placed prehistoric archeological sites far out of their proper environmental context. Based upon the reconstruction of the lands subject to tidal influence (Atwater 1982) and a landforms/soils map, it is possible to view more clearly late prehistoric archeological sites in their original environment (West 1994:GIS Map 6). The data are compatible to those observed in the Cosumnes River area (Pierce 1988).

Reconstructed watercourses, areas presently and formerly subject to tidal influence, and other features of surface geology (Atwater 1982) were used as a basis for generating predictive models of prehistoric settlement patterns in the south Delta region (West 1994). The reconstruction of environmental features in the south Delta suggests a relationship between specific natural features (e.g. streams, major water channels, margins of tidal wetlands), sediment type, and elevation and the presence of archeological sites. Further mapping of extinct water courses can help to explain the location of other sites, and can be used to define areas of sensitivity for archeological sites which may now be buried. While the relationship between cultural chronology

and site distribution has not been addressed in this study or the previous South Delta study such analysis is warranted in future studies. Finally, by age dating the sediments on which sites are found may be useful in predicting the location of the same period sites.

Special Designations

Several sites or localities within the study area have received special designations. The National Register of Historic Places (NRHP), managed by the Federal government, and the California Register of Historical Resources (CRHR), operated by the state of California, have been discussed above. In addition to the NRHP, there is another designation that underscore the significance of prehistoric and historic sites. National Historic Landmarks, established by the Historic Sites Act of 1935, identifies properties that hold exceptional value in commemorating or illustrating the history of the United States.

The State of California has other special designations besides CRHR. California Historical Landmarks acknowledge properties of statewide historical interest and the program is divided into several themes. California State Points of Historical Interest recognizes properties of local, city or county interest. Finally, the California Inventory of Historical Resources was a one-time report prepared in 1976 that listed areas of historical interest throughout the state. Many of these properties were included on other lists or designations.

Discussion of Table.....

County	Name	NRHP	NHL	CHL	SPHI	CIHR	CHR	Comments
CCO	Isleton Bridge	E						
CCO	Hard House	L		X				
CCO	Marsh House	L						
CCO	Pittsburgh Historical Dist	E						27 Properties
CCO	CCO-129, 147, 678	EEE						
SAC	Locke Historical District	L				X		48 Properties
SAC	Isleton Historical Dist	E						41 Properties
SAC	Walnut Grove Hist Dist	E						67 Properties
SAC	Rosebud Ranch	L						
SAC	Leonidas Taylor Monument					X		
SAC	SAC-43, 76/H	EL				X		CIHR: SAC-76
SJO	California Chicory Works			935	X			
SJO	Bacon Island Hist Dist							X Properties
SJO	Sailing Launch Landing			437				
SJO	Benson's Ferry			149		X		
SJO	Mokelumne City			162		X		
YOLO	1st Pacific Salmon Cannery	L	X			X		No remains
YOLO	YOL-42	L						

Table 2. Listing of prehistoric and historic sites holding special designations. Key: **NRHP**: National Register of Historic Places; **NHL**: National Historic Landmark; **CHL**: California Historical Landmark; **SPHI**: State Point of Historical Interest; **CIHR**: California Inventory of Historical Resources; **CHR**: California Historical Register.

Traditional Properties/Sacred Sites

A review of the primary ethnographic literature for the study area found no traditional properties or sacred sites. We requested information from the Native American Heritage Commission on the presence of traditional cultural properties. They referred us to a list of 14 individuals, from whom we also requested information on Delta. We received one phone call and as a result sent out two additional requests. No information has been offered on traditional cultural properties or sacred sites within the study area.

DRAFT

Conclusions and Recommendations

As a result of this study we believe that it is possible to predict with a favorable degree of confidence the likelihood of finding prehistoric sites in the study area using the variables selected. Further we believe that the overwhelming majority of prehistoric sites for the study area have been recorded and the likelihood of discovering new sites will be limited to specific areas noted above. New discoveries will also occur as a result of excavation.

To test and strengthen the model it is recommended that Atwater's remaining higher resolution mapping of former channels and deposits be digitized for the study area. With the higher resolution mapping distributional relationships with the variables most closely correlated with site location will be clarified. Further, we recommend that for any large area studies outside of the study area done for CALFED that similar GIS based studies be preformed prior to implementation of on-the-ground surveys.

For historic sites there is not the strong relationship between the variables selected and site location. We recommend that additional variables be examined prior to abandoning the use of GIS based systems for analysis of historic site location.

Finally, after the CALFED alternatives are selected additional identification efforts will be required to identify and evaluate both prehistoric and historic resources to be in compliance with the National Historic Preservation Act. These efforts may include on-the-ground surveys, remote sensing, additional GIS analysis, or a combination of these approaches. If it is found that a significant historic property cannot be avoided, mitigation measures will be required. Such measures might be protection, recordation, data recovery, or redesign. All mitigation measures must developed through consultation by the lead Federal agency with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

AppendixPaleontologic Resources

Spencer (1989) reviewed the records for vertebrate paleontological sites in the Sacramento-San Joaquin Delta and surrounding region and prepared a sensitivity map for the probability of encountering fossils. In the Delta proper Spencer noted three localities- (1) an Holocene baleen whale skeleton from the center of Mandeville Island, (2) fossil horse bones recovered from a water well in Lincoln Village, Stockton, and (3) a large unidentified mammal from Tule Canal near Clarksburg (elevation 20' above mean sea level). A much larger number of fossil localities are present on the margins of the Delta. All locations, except for two, are above sea level. Pleistocene Rancholabrean remains (horse, camel, and sloth) were recovered from a gravel pit 2 miles east of Antioch. The depth of the finds are unknown but it is below sea level since the gravel pit was excavated to 125 feet below the land surface. Other vertebrate fossils have been found during minus tides near the Big Break-Jersey Island channel of the San Joaquin River.⁴

Spencer (ibid) concluded that there was a low probability of finding vertebrate fossils in the Delta. Her sensitivity map placed the boundary of higher sensitivity to the west of Old River, including Byron, Veale Tracts, Clifton Court and lands south of Old River. Depths less than 10-15' also were considered less sensitive, yet the Holocene whale on Mandeville Island was found less than 2 feet below the present land surface (19.2' below mean sea level).

An additional records check was made at the Museum of Paleontology, University of California, Berkeley (UCMP), on July 5, 1994. No new vertebrate fossils localities have been recorded for the region since Spencer's 1989 study. Not noted in the previous study and not recorded at UCMP was a newspaper account of a mammoth find while excavations were being made for a well near Tracy in the late 1800's (USBR files). However, it is clear that the likelihood of finding vertebrate fossils in the Delta area is low.

Sediments of the Delta also contain Holocene age macro- and microscopic fossils -seeds, pollen, and diatoms- that can provide significant data about past environments (Wells, _____ 199_, West 1977).

Should fossils be encountered during excavations, a professional paleontologist should be contacted through the University of California Museum of Paleontology, Berkeley to evaluate the find and provide recommendations for recovery and analysis.

⁴ Spencer lists this locality as outside of the delta, but it is clearly within the delta and subject to tidal changes. Age of the fauna is not provided and additional information on the locality was not found at UCMP.

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